

Monte-Carlo study of the Higgs boson production in association with a single top quark at $\sqrt{s} = 13\text{TeV}$ at LHC

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A direct search for the production of a Higgs boson in association with single top quark is performed. The analysis considers single top quark production via t channel and uses Higgs boson decays to a bottom quark-antiquark pair and semileptonic top quark decays. Such process is strongly suppressed in the Standard Model. An observation of this production mode would be an unambiguous indication of the New Physics providing an important insight on the nature of the Higgs mechanism. The production is sensitive to the relative sign of the coupling parameters describing its interaction with fermions and gauge bosons. We present a Monte-Carlo study of the $pp \rightarrow tHq$ process and discuss the experimental signatures that can help to discover it at the LHC. Two scenarios have been considered, the Standard Model case and the Inverted Top Coupling scenario.

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